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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,281	07/10/2003	James E. C. Brown	TI-36887	2447

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EXAMINER
VLAHOS, SOPHIA

ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/617,281	BROWN, JAMES E. C.	
	Examiner	Art Unit	
	SOPHIA VLAHOS	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 June 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,5,6,9,10,12,14,15 and 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5,6,9,10,12,14,15 and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *7/10//03* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 6/17/08 have been fully considered but they are not persuasive. Independent claims 1 and 10 have been amended to include limitations: "…said correlation feedback signal being used and driven to near zero for adjusting…." and "…by driving said correlation feedback signal to near zero.." respectively. Allegedly, these limitations are not disclosed in any one of the prior art documents Furthermore Applicant states "…(as a matter of fact, none of the prior art use a correlation feedback signal)." (Page 6, last sentence of ¶4 in section "Rejections under 35 U.S.C. §103(a)").

Monhindra '341 teaches that the DSP 40 adjusts adjustable filter characteristic and minimizes the left term of eqn 4 (see column 9, lines 1-3, the left term of eqn 4 is a feedback signal, and when the phase imbalance is corrected for, this term is minimized (driven to near zero)).The difference between the teachings of Mohindra '341 is that a cross correlation feedback signal is not expressly taught.

However, Mohindra '829 teaches computing a cross-correlation feedback signal (see column 3, lines 16-51, used to adjust a relative phase of a LO to correct for phase imbalance. Therefore Applicants argument "…(as a matter of fact, none of the prior art use a correlation feedback signal)." (Page 6, last sentence of ¶4 in section "Rejections under 35 U.S.C. §103(a)") is not accurate.

Column 3, line 45 of Mohindra shows that a cross-correlation of I and Q signals is equal to K sin (θ) term where θ is a phase error, see also column 3,

lines 19-21 where the cross correlation signal is used and driven to zero when phase imbalance is corrected for (i.e. I and Q signals have a 90 degree phase difference).

A K sin (θ) term is also shown by Mahindra'341 column 8, eqn 4, and at the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify Mohindra '341 based on the teachings of Mohindra '829 to compute a cross correlation feedback signal being used and driven to zero for adjusting said adjustable characteristic. Refer to 35 U.S.C 103(a) rejections of independent claims 1, 10 as being unpatentable over Mohindra (U.S. 7,035,341) in view of Mohindra (U.S. 6,744,829) that follows and includes a more detailed explanation & rejection rationale.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 9, 10, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohindra (U.S. 7,035,341) in view of Mohindra (U.S. 6,744,829).

With respect to claim 1, Mohindra (341) discloses: a calibration tone generator (Fig. 4, element 40, "DSP", column 5, lines 40-42, 58-59) for generating a calibration tone for providing in-phase (I) and quadrature phase (Q) tone components (Fig. 4, outputs of mixers 64, 65 of receiving side that receive the calibration tone, column 6, lines 1-3); I and Q filters for filtering said I and Q calibration tones for issuing filtered I and Q output tones having an undesired frequency dependent I/Q phase error (see Fig. 4, elements and 72 and 74 all-pass filters, all-pass networks are used as a preferred embodiment- see column 9, lines 9-18)) at least one of the I and Q all pass filters having an adjustable characteristic (see column 9, lines 10-26, 34-36,where the cutoff frequency of at least one of the all pass filters is the adjustable characteristic); adjusting said adjustable characteristic for reducing said frequency dependent I/Q phase error (Fig. 4, DSP, element 73, "Adjust", and elements 72 and 74 the "all-pass filter", see column 8, lines 1-9, lines 17-18 $\Delta\varphi BB$ the frequency dependent baseband band IQ phase error (column 8, equation (4), column 9, lines 1-13, lines 37-50) and for minimizing a phase difference between said I output tone and said Q output tone (see column 9, lines 37-42, where adjusting the cut-off frequency minimizes the left term of equation [4] and the frequency dependent IQ relative phase error (phase difference)) ; wherein said I and Q filters include an I analog filter for providing said I output tone and a Q analog filter for providing said Q output tone and said adjustable characteristic is a cutoff frequency of at least one of said I and Q analog filters (see the use of analog (R, C based) components to implement and adjust the I and Q filters, column 9, lines 14-27).

Although Mohindra ('341) teaches analog all-pass networks, (as a preferred embodiment), Mohindra ('341) teaches low-pass filters (column 9, lines 50-55, (RC-based i.e. analog filters (similar to the all pass networks described in detail) low pass filters, for the same use as the all pass filters). Therefore at the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Mohindra, and use analog low-pass filters (although somewhat inferior to the all-pass networks), when not concerned with frequency dependent IQ gain imbalances (Mahindra column 9, lines 50-52).

Mohindra (341) does not expressly teach: a correlator for cross correlating said I and Q output tones for providing a cross correlation feedback signal, said correlation feedback signal being used and driven to near zero for adjusting said adjustable characteristic.

In the same field of endeavor, Mohindra (829) discloses: a correlator for cross correlating said I and Q output tones (see Fig.3, cross-correlation by mixer of $V_I(t)$ and $V_Q(t)$, column 3 lines 17-20, specifically lines 42-51 and equation on line 45 right hand side). With respect to the limitation "said correlation feedback signal being used and driven to near zero for adjusting an adjustable characteristic, see column 3, lines 16-21, cross-correlation feedback signal is substantially zero, and used to adjust a relative phase of a LO).

At the time of the invention, it would have been obvious to a person of ordinary skill in that [Eq. 4] of Mohindra (341) see that right side of the equation is $K_3 \sin(\Delta\Phi_{BB})$ is equal to the right hand side of the equation on line 45 of column 3

of Mohindra (829) and therefore it would have obvious to a person of ordinary skill in the art that the $I_{sin}(t)Q_{cos}(t)$-$I_{cos}(t)Q_{sin}(t)$ (equation 4 of column 8 of 7,035,341) performed by DSP 40 of Mohindra (341) be replaced by the computation of a cross-correlation which is equal to $asin(\theta)[n_I(t)*n_I(t)]$ of the equation on line 45 of column 3 of 6,744,829 (column 3, see lines 14-50, see computation of cross correlation) since computing the latter equation is independent of a gain and simple to implement (column 3, lines 42-44 and see Fig. 3).

Incorporating the teaching of Mohindra (829) in the system of Mohindra (341) results into using a correlation feedback signal (in place of the computed Isin(t)Qcos(t)-Icos(t)Qsin(t) of Mohindra (341) and column 9, lines 38-40) being used and driven to near zero for adjusting said adjustable characteristic (the R and/or C values of each filter of Mohindra '341)..

With respect to claim 9, Mohindra ('341) further discloses: a frequency down-converter including a local oscillator for providing a complex LO signal and I and Q frequency down-converters using said LO signal for down-converting an input signal having a carrier frequency to I and Q signal components (see Fig. 4, combination of elements LO, filter and PLL (approximately in the center of Fig. 4), mixers 64, 65 of receiving side of transceiver, column 6, lines 1-3); and wherein: the calibration tone generator issues a calibration signal as said input signal having a certain frequency offset from said carrier frequency for providing

said I and Q calibration tone components in place of said I and Q signal components (see column 5, lines 67 and column 6, lines 1).

With respect to method claims 10, 18 these method claims are rejected based on a rationale similar to the one used to reject apparatus claims 1, 9 respectively,

4. Claims 3, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohindra (U.S. 7,035,341) in view of Mohindra (U.S. 6,744,829) as applied to claims 1, 10 respectively, and further in view of Armstrong et. al., (U.S. 5,559,828).

With respect to claim 3, all of the limitations of claim 3 are analyzed above in claim 1, except for: said calibration tone has a frequency near to a cutoff frequency for said I and Q filters. In the same field of endeavor, Armstrong et. al., disclose: said calibration tone has a frequency near to a cutoff frequency for said I and Q filters (column 9, lines 15-18). At the time the invention, it would have been obvious to a person of ordinary skill in the art to have the calibration tone have a frequency near to a cutoff frequency for said I and Q filters and the rationale behind this modification is that filters at the receiver are (theoretically) supposed to be designed to coincide/match with the transmitted signal characteristic.

Claim 12 is rejected based on a rationale similar to the one used to reject claim 3 above.

5. Claims 5, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohindra (U.S. 7,035,341) in view of Mohindra (U.S. 6,744,829) as applied to claims 1, 10 respectively, and further in view of Pole-Zero placement applet (internet java applet http://www.earlevel.com/Digital%20Audio/PoleZero.html) (2/27/2003).

With respect to claim 5, all of the limitations of claim 5 are rejected above in claim 1, except for: said cutoff frequency is adjusted by frequency scaling at least one pole and at least one zero of said at least one of said I and Q analog lowpass filters by a certain common factor.

However the above is disclosed by the Pole zero placement java applet (in the applet see effects (change) on cutoff frequency by (moving) scaling the pole/zeros (including the case where the zero-pole pair is scaled by a common factor)).

Therefore at the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Mohindra et. al., based on the teachings of the Pole-Zero placement document/java applet, to change the cutoff frequency in a simple manner.

With respect to claim 14, method claim 15 is rejected under a rationale similar to

the one used to reject apparatus claim 5.

6. Claims 6, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohindra (U.S. 7,035,341) in view of Mohindra (U.S. 6,744,829), Pole-Zero placement document (internet java applet http://www.earlevel.com/Digital%20Audio/PoleZero.html) (2/27/2003) as applied to claims 1, 10, and further in view of Whiteside (U.S. 5,686,863).

With respect to claim 6, all of the limitations of claim 6 are analyzed above in claim 1, except for: wherein said common scale factor is adjusted by adjusting a channel resistance of at least one transistor. Solving the same problem (i.e. changing the location of a pole/zero pair), Whiteside discloses: wherein said common scale factor (see column 3,lines 3-9 and column 4, lines 30-35, lines 40-47, the RC constant that determines the center frequency of the pole/zero pair, and by varying the resistance of the MOSFETs it is adjusted) is adjusted by adjusting channel resistance of at least one transistor (column 4, lines 40-47).

Therefore, at the time of the invention, it would have been obvious to a person skilled in the art to modify the system of Mohindra based on the teachings Whiteside, so that the said common scale factor is adjusted by adjusting channel resistance of at least one transistor so that a tunable pole/zero pair (tunable with respect to the .pole/zero spacing and center position) can be generated so a desired amount of gain or attenuation is provided at any given frequency (see

Whiteside column 1, lines 44-49, and "summary of the invention" where the invention is a low-power device).

With respect to claim 15, method claim 15 is rejected under a rationale similar to the one used to reject apparatus claim 6.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SOPHIA VLAHOS whose telephone number

is (571)272-5507. The examiner can normally be reached on MTWRF 8:30-17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner, Art Unit 2611
8/4/2008

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